

## WHY

Spray water leakage tests of lithium-ion batteries for electric vehicles in the world's largest testing centre for high-voltage batteries

## HOW

Turnkey solution  
IPX 5, IPX 6, IPX 6K and IPX 9K  
According to VW 80000:2017 LV 124 K10 & K-11  
ISO 20653 and DIN EN 60529

## WHAT

Technical equipment of a damp room for water protection type tests  
Jet nozzle for IPX 5, IPX 6 and IPX 6K tests  
Nozzle rack for IPX 9K tests  
Sensors, control system, machine unit

## WHY - The challenge.

FEV Group GmbH has built the world's largest development and test centre for high-voltage batteries for electric vehicles in Saxony-Anhalt. A wide variety of environmental simulation tests are carried out on 15,500 square metres and in around 70 facilities.

This also includes leakage tests. During the tests, lithium-ion batteries or entire battery packs are exposed to water jets of a defined strength for a set period of time. The test facility is designed to enable the IP protection type tests IPX 5, IPX 6, IPX 6K (jet water, strong jet water, under increased pressure) and IPX 9K (high pressure/steam jet cleaning) to be carried out. For the IPX 9K test, the test item shall be rotated during the test. The system shall allow for electronic test reports.

The customer provides a tiled damp room as a test room, for which the complete technical equipment including regulation and control technology was to be supplied.



## HOW - The idea.

The leak tests according to IPX 5, IPX 6 and IPX 6K are carried out manually with a jet nozzle. Water is sprayed onto the test specimen from the distances specified in the standard at ambient temperature and a water pressure of 0.3 to 10.0 bar.

For the high-pressure/steam jet tests according to IPX 9K, a nozzle rack is fixed to the ceiling above the test object, the rotating platform is realised on site. As this cannot be rotated itself as required by the test standard due to its size of up to 1 x 2 metres, the nozzle rack is rotated instead. In the process, 80 °C hot water is sprayed onto the test material at a pressure of 80 to 100 bar.

### WHAT - The solution.

The jet nozzle for IPX 5, IPX 6 and IPX 6K tests is wall-mounted and equipped with digital pressure and flow sensors. It is connected to a water supply station with water tank and booster pump located outside the test room.

The nozzle rack for IPX 9K tests, mounted on a turntable, consists of holder tubes to which four adjustable nozzle arms are attached. A high-pressure flat spray nozzle on each nozzle arm sprays the test material at angles from 0 to 90 degrees. The nozzles are each offset by 30 degrees and equipped with digital pressure and flow sensors.

### Selected Product: **Specific components for spray water tests**

A machine section outside the test room contains a high-pressure unit to generate the water pressure of 80 to 100 bar required for the IPX 9K protection test, and a temperature control unit to heat the water to 80 to 100 °C.

### Design features:

- Equipment of the test room provided by the customer with complete testing technology
- Realisation of a special construction project with the help of standard components
- Electronic acquisition and recording of all operating and test data for the creation of electronic test reports via the SIMPATI<sup>®</sup> control software